near the 50th parallel between the 10th and 20th meridians. Storm log:

American S. S. *Mongolia:*

Gale began on the 31st, wind WNW. Lowest barometer 29.46 inches on the 31st, wind NW. 8, in latitude 49° 28′ N., longitude 13° 30′ W. End on the 31st, wind NW. Highest force of wind 8, NW.; steady from NW.

The American S. S. *Leviathan*, while in mid-ocean reported a moderate gale from noon to midnight on the 31st. Storm log:

Gale began on the 31st, wind NE. Lowest barometer 29.71 inches at 1 p. m. on the 31st, wind NE., 8, in latitude 44° 25′ N., longitude 37° 29′ W. End on the 31st, wind NE. Highest force of wind 8; steady NE.

NORTH PACIFIC OCEAN.

By F. G. TINGLEY.

The unusual activity which characterized the weather of the North Pacific Ocean in June gave place for the most part to typical midsummer conditions in July. Gales in the higher latitudes became infrequent and there was a decrease in the number of typhoons. Fog increased in the regions where it commonly forms in the summer season.

Pressure in the Aleutian area averaged very close to normal, as shown by observations at Dutch Harbor. In July pressure here reaches its highest point for the year, the monthly average of available observations being 30.02 inches as compared with an annual average of 29.76 inches. In the month under consideration pressure was below normal generally throughout the first half of the month and again at the close, with a period of high pressure from the 16th to 26th. The highest reading, 30.40 inches, was recorded on the 21st; the lowest, 29.70, on the 5th. Absolute range 0.70 inch. At Midway Island pressure continued below normal, the deficiency being some 0.09 inch. The normal here for July is 30.10 inches. The highest reading for the month, 30.12, occurred on the 23d; the lowest, 29.80, on the 5th. At Honolulu pressure was approximately normal, or 30.01, for the p. m. observations. The highest reading, 30.07, was recorded on the 7th; the lowest, 29.86, on the 13th. Precipitation at Honolulu was only 0.25 inch, the month being the third driest July on record. This follows the driest June of record, when only 0.17 inch fell. The normal precipitation for July is 1.19 inches; for June, 0.92 inch.

The North Pacific high-pressure area was very constant throughout the month. During the periods of low pressure at Dutch Harbor its center lay between the Hawaiian Islands and the Gulf of Alaska. As pressure rose in mid-ocean on the 16th the anticyclone became elongated, with the major axis lying east and west and the center shifted some 10° to 15° to the westward.

Reports at hand indicate that low pressure prevailed over the waters of the Far East throughout the month.

As the month opened the most important feature of the weather was the typhoon in the China Sea. This storm had appeared on June 27 about 300 miles to the east of southern Luzon and had traversed the northern part of that island on the 29th, doing considerable damage. Its path there inclined to the northward and it entered China, apparently, during the night of July 2–3, eastern time, a few miles west of Macao, where also it was reported to have caused much damage.

On the 2d a depression appeared to the northwestward of Midway Island, whence it moved during the 3d and 4th in a northeasterly direction, increasing somewhat in intensity, and on the evening of the 5th was centered over Dutch Harbor, where the barometer registered 29.70 inches. Vessels in the vicinity reported moderate to fresh gales. Coincident with this depression a disturbance over Japan caused fresh to strong shifting gales in near-by waters.

On the 5th and 6th violent local storms prevailed off the coast of southern Mexico and Guatemala. The following report of these storms has been received from the American S. S. *Ethan Allen*, Capt. W. H. Stanford, San Pedro for Balboa. Second Officer John S. Weldon states that the first indication of these two gales, or squalls, was a gathering of heavy black clouds on the horizon in the direction from which the wind came. These moved very rapidly and when nearly overhead the wind struck. From the time that the clouds first appeared to the time when wind struck was not over 30 minutes, the wind coming in little puffs from all directions. There was no gradual increase in force of wind—it struck with full force. The first gale occurred from 3.30 a. m. to 9 a. m. of the 5th in 14° 17′ N., 94° 10′ W.; the wind direction was ESE. to E. and it attained force 11, E. The lowest barometer, 29.91, corrected, occurred at 4 a. m. This blow was accompanied by thunder and severe lightning, and heavy rain fell at times.

The second gale occurred between 12.40 a. m. and 5 a. m. of the 6th, in 12° 50′ N., 90° 40′ W. The wind blew steadily from ENE., reaching force 12. The lowest barometer was the same as in the preceding storm. There was severe lightning but very little thunder. Light to moderate rain fell throughout.

These sudden, short-lived gales continued until at least the middle of the month. The American S. S. *Charles Pratt*, Capt. Geo. E. Bridgett, also from San Pedro for Balboa, experienced one on the 8th, when between Chamela Bay and Manzanillo; another on the 11th, in 15° 30′ N., 97° 45′ W.; and a third on the 14th beginning at 10° 45′ N., 88° 20′ W. According to the descriptions given by First Officer H. Thorsen, these gales were not so violent as those encountered by the *Ethan Allen*, the wind attaining forces 7, 9, and 8, re-respectively, in the three.

The American S. S. *Ipswich* also reported a severe electrical storm off Acapulco during the night of the 15th, followed by heavy wind and rain squalls.

On the 12th the British S. S. *Eburna*, Capt. D. O. Evans, San Pedro for Yokohama, experienced a southwesterly gale in 33° 58′ N., 165° W., due to a trough-like depression extending from Alaska to the neighborhood of Midway Island. Second Officer H. W. Elgat states:

At 8 a. m. (civil time) experienced a very heavy west swell, wind at times being SSW., gale force. Wind and sea increased toward midday, when the wind attained its highest velocity (10, SSW.). At 2 p. m. wind shifted to SW. and commenced to decrease. At 5 p. m. wind shifted to W. by S., sea and wind decreasing. Midnight, wind W., with heavy westerly swell. Heavy rain squalls throughout. Lowest barometer 29.74 inches, at 8 a. m. of 12th.

On the 20th and 21st moderate to fresh southerly to southeasterly gales were experienced by several ships in mid-ocean. These gales occurred on the western side of the North Pacific HIGH and in the front of a depression that advanced from the region of the Bonin Islands. This depression apparently dissipated on the 22d in the region southeast of Kamchatka.

Reports at hand indicate that during the last week of July a series of depressions moved northeastward over Japan and adjacent waters and also point to the formation

of one or more typhoons in the region of the Philippines. It will be necessary, however, to have additional reports to determine the actual conditions within these areas.

GALE IN SOUTH ATLANTIC OCEAN.

The British S. S. *Vestris*, Capt. O. Penrice, experienced a heavy gale upon leaving Buenos Aires for New York in the early part of July, this year, of which First Officer A. G. T. Brown has furnished the following report:

July 9. Left Buenos Aires at noon. Strong SE. gale with heavy rain; heavily overcast and hazy.

July 10. Breeze falling light, leaving heavy swell (2 a. m.); 3 a. m. to 6 a. m., thick fog patches; 6.30 a. m., wind came from N'ly, increasing steadily and backing slowly; 6 p. m., strong WNW. wind and confused sea; overcast, St. Cu.; bar. 29.41, steady. By midnight, July 10-11, vessel not steering; whole gale from W.-WNW.; huge seas doing considerable damage; constant stream of spray and small seas deluging vessel fore and aft; bar. 29.57, rising slowly.

July 11. 8 a. m. vessel hove to, heading WNW.; wind about W. by S. Noon, similar weather; no apparent moderation; very hazy; bar. 29.81, still rising. 3 p. m. vessel resumed course and speed. 8 p. m. wind and sea moderating rapidly; heavy showers.

July 12. Wind and sea moderating all day; bar. rising steadily; weather fine and clear.

The lowest barometer recorded was 29.29 inches at Buenos Aires. Highest wind, force 10, W. by N. Shifts of wind, SE.-NW.-WNW.-W.-WSW.-SW. by W.

(F. G. T.)

DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

By A. J. HENRY.

From a physiological view point the most significant feature of the weather of northeastern United States was the absence of prolonged high temperature or, what amounts to the same thing, the rather frequent occurrence of cool spells due to the movement of anticyclonic areas over from the Hudson Bay region. West of the Appalachians mean temperatures were somewhat higher.

The rainfall was rather irregularly distributed.

The usual details follow.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

Low-pressure areas were numerous, but rather ill-defined and often difficult to trace from day to day. A majority of these depressions were first noted in western Canada. These moved southeastward, and there were frequent secondary formations in middle latitudes; but in no case did they develop storm intensity.

High-pressure areas were fairly numerous, nine of which seemed worthy of tracking; but, on the whole, they were unimportant, except that they gave pleasant alternations to cooler and drier weather, particularly over northern and central districts east of the Mississippi River. Four of these anticyclones were of the Hudson Bay type.

FREE-AIR SUMMARY.

By L. T. SAMUELS, Meteorologist.

Free-air temperature departures for July showed practically no change from the surface to 3,000 meters. (See Table 1.) In agreement with Climatological Chart III, the largest positive departures occurred at Ellendale, becoming smaller southward and eastward, and finally negative at Due West. This resulted in the interesting relationship found between the mean temperatures for the 3,000-meter level for the various stations. For example, Ellendale, the northernmost station, has a higher mean temperature for this level than Drexel, which in turn is higher than Broken Arrow, Due West, and Royal Center.

Relative humidity departures were mostly small except in the highest levels where the apparently large departures were the result of fewer observations, and therefore less reliable means.

Vapor-pressure departures were mostly positive. At Ellendale from the surface to 3,000 meters were found the highest mean monthly values for July since the establishment of the station in 1918. The resultant winds at this station (see Table 2) differed considerably from the normal both in velocity and direction. The normal at the surface and lower levels, it will be observed, is extremely light and therefore the corresponding direction carries little significance.

This month, however, the velocities were moderately high and likewise the resultant directions, which had a strong south component were closely related with the positive temperature departures previously referred to. In general the resultant winds at the other stations did not differ greatly from the normals both in direction and velocity. Pilot-balloon observations over the country showed a predominant easterly wind above 5,000 meters south of latitude 35° and a westerly north of this latitude. These upper easterly winds were observed at Groesbeck, extending to the highest level reached, which was 13,000 meters. At Ellendale not a single observation showed easterly winds above 5,000 meters, westerly being found to at least 12,000 meters.

There were apparent on the free-air wind charts during the month occasions when the winds at 4,000 and 5,000 meters showed a decidedly anticyclonic circulation, i. e., northerly over the eastern coast, easterly over the Gulf region, southerly over the Plains States, and westerly over the northern region. From an examination of the maps for these periods there seemed to be a connection between this condition and a warm period at the surface, i. e., there was usually a HIGH over the southeastern part of the country merged with the permanent Atlantic HIGH, a condition favorable for warm weather over the eastern part of the country. Such conditions occurred on the 6th, 9th, 20th, and 22d.

A number of cases occurred where southerly winds were overrun by northerly winds. On these occasions the southerly winds resulted from high pressure to the eastward, and usually between 2,000 and 3,000 meters above a reversal to northerly was found. This condition was characteristic only over that portion of the country east of the Rocky Mountains. The opposite condition, i. e., southerly winds overriding northerly ones